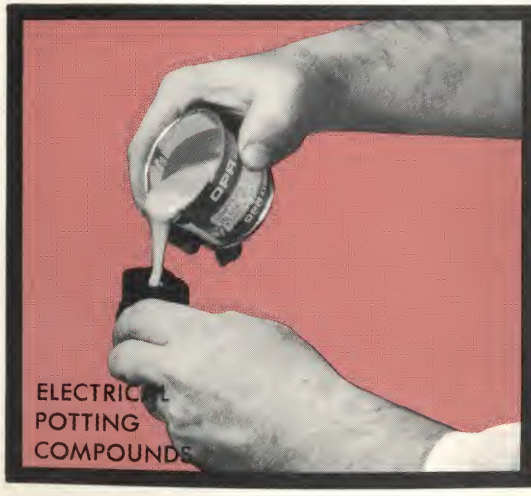
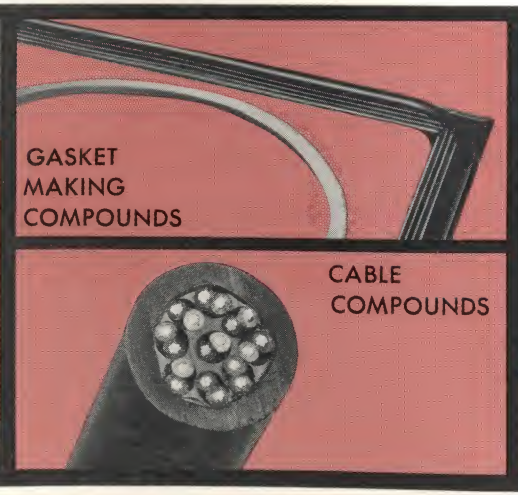
DPR®

FLOWABLE RUBBER (DEPOLYMERIZED)

TWO FORMS

1. COMPOUNDED FOR SPECIFIC USE
2. STRAIGHT DEPOLYMERIZED RUBBER FOR YOUR OWN COMPOUNDING





DPR® INCORPORATED *A SUBSIDIARY OF THE* **H. V. HARDMAN CO., INC.**
600 CORTLANDT ST. BELLEVILLE, N. J. 07109

DPR, Incorporated Customer Service and Applications Laboratory

DPR® is available in two basic forms:

1 **Compounded** as castable rubber polymers for specific uses such as, potting compounds and cable fillers, flexible mold preparation, pour-in-place gaskets and other applications requiring a pourable liquid that converts to a flexible rubber.

2 **Straight (uncompounded)** for use by manufacturers as a basic ingredient or processing aid in the production of a variety of proprietary products such as, sealants, adhesives, electrical tapes, grinding wheels, bowling balls, hard and flexible rubber products, tank linings, dry lubricants, pigment and graphite dispersions. Straight DPR is a 100% solid, low molecular weight, pourable rubber hydrocarbon.

Technical assistance is available.

DPR, INCORPORATED is willing to grant non-exclusive licenses under U.S. Patent No 3,160,595 at a reasonable royalty rate

ROOM TEMPERATURE CURING

CASTABLE RUBBER POLYMERS

WHAT THEY ARE:
DPR Compounds are two-part, liquid mixtures which cure at room temperature to flexible rubbers. The basic ingredient is isoprene rubber that has been depolymerized, reducing it to a pourable state without the addition of solvents. Then, compounding techniques incorporate appropriate fillers and extenders that improve workability and decrease costs. Their most common applications are electrical potting and encapsulating, preparation of flexible molds and the production of poured gaskets. They are also very useful as a low cost space filler where good resilience and sealing properties are a consideration.

MIXING:
The proportioning and mixing procedures are simple. You merely weigh out the required amount of the base rubber (Part A) and the proportionate amount of curing agent (Part B). The amount of Part B to be used in a mixture is large enough to make its handling easy and the accuracy non-critical. Where standard amounts will be mixed repeatedly, the amounts of Parts A and B can be converted to volumes to further reduce preparation time. No skilled personnel are required to successfully use DPR Compounds.

DPR® COMPOUNDS

Low speed, power stirrers must be used. The frictional heat caused by high speed mixing can drastically shorten the pot life. Be certain to scrape the sides of the container during mixing. Do not scrape unmixed material from the sides when pouring.

Helpful hint: When emptying DPR cans, cut the "lips" off the cans with a rotary can opener. This will facilitate emptying the cans.

Equipment is available for handling two-part DPR. TRIPLEMATIC® machines ranging from the simple TWO-PORTIONER for $245 to fully automatic proportioning, mixing and dispensing can be obtained from the H. V. Hardman Co., Inc., TRIPLEMATIC Division, 600 Cortlandt Street, Belleville, New Jersey.

TOXICITY:
Room temperature curing DPR's are in the same category as ordinary lead containing house paints. Therefore, unlike reactive resin systems, DPR Compounds present minimal handling problems. Basic simple precautions are necessary like keeping out of the mouth and washing hands before eating or smoking.

CURING:
The *sulfurless* room temperature curing system uses lead dioxide as the activating agent. The cure takes place with practically no exotherm to stress delicate components or cause undesirable bubbling or shrinking. This curing process takes place uniformly regardless of section thickness or whether exposed to air or in a hermetically sealed space. Curing time can be lengthened or shortened by varying the curing agent ratio over prescribed limits. Further shortening can be accomplished by adding an accelerator and/or using low heat in the 110°F-140°F. range.

SURFACE TACK:
DPR surfaces exposed to air during room temperature cure tend to remain slightly tacky for a short period. This usually disappears by itself after a few days or can be immediately eliminated by dusting with talc, corn starch or other inert powders. The tacky-stage time seems to be a function of the cure rate. Long pot life castings may remain tacky for a day or two while accelerated cures or those utilizing low heat will create a tack free casting almost immediately.

USEABLE TEMPERATURE RANGE:

Cured DPR Compounds are true elastomers with excellent vibration and shock absorbing qualities. They retain these elastomeric properties at temperatures down to −75°C (−103°F). The heat resistance capability depends upon the application. These materials will withstand short term heat up to 150° C. and long term operation at 105° C. depending upon the design of the component. The DPR Compounds described herein are formulated to contain a percentage of transformer oil. The use of these oils reduces the viscosity of the uncured rubber compound and your cost per gallon. The oils become a part of the rubber's molecular structure when the compound cures to its solid form. They also contribute to the excellent electrical properties since they are the same high boiling point oils used to insulate high voltage transformers. These DPR Compounds will harden and permanently lose some of their rubbery characteristics when subjected to temperatures above 80° C. in an environment simulating lengthy unprotected exposure in an oven. Under these conditions some of the transformer oil is evaporated and hardening and shrinkage results. A beaker full of transformer oil would evaporate completely under this same circumstance. Tests have shown that when the DPR Compound is placed in a covered container it will withstand continual exposure to 105° C. and show negligible shrinkage, weight loss or hardening. Since these transformer oils are used in both Class A and B applications, it follows that DPR Compound can be used for the same applications. Furthermore, a component that operates at 105° C. embedded in DPR does not exert the same evaporation phenomenon created within an oven at this temperature. The DPR dissipates this heat more quickly than other elastomeric potting materials, and the outer surface of the DPR actually remains relatively cool. Some room temperature curing DPR Compounds exhibit better heat aging properties than others. Therefore, if heat stress is a factor in your application, select your DPR Compound accordingly. For good resistance to temperatures in the 150° C. range, consider the use of one-part, heat cured DPR Compounds.

SHRINKAGE & DIMENSIONAL STABILITY:

Since DPR Compounds are 100% solids (containing no volatiles) and exert no apparent exotherm during cure, shrinkage is negligible and critical components are not stressed during the cure cycle.

Concerning dimensional stability after cure, it must be recognized that DPR is a true elastomer and that regardless of cost or claim, all elastomers are subject to some change when exposed to stresses of time and temperature. Neither the polysulfide nor the silicones are better than DPR for the low and moderate temperature ranges. The superiority of the silicones must be recognized for high temperature ranges. The lowest cost, Compound #242 is least resistant to shrinkage. Compound #336 is the most dimensionally stable material.

EXCELLENT ELECTRICAL PROPERTIES:

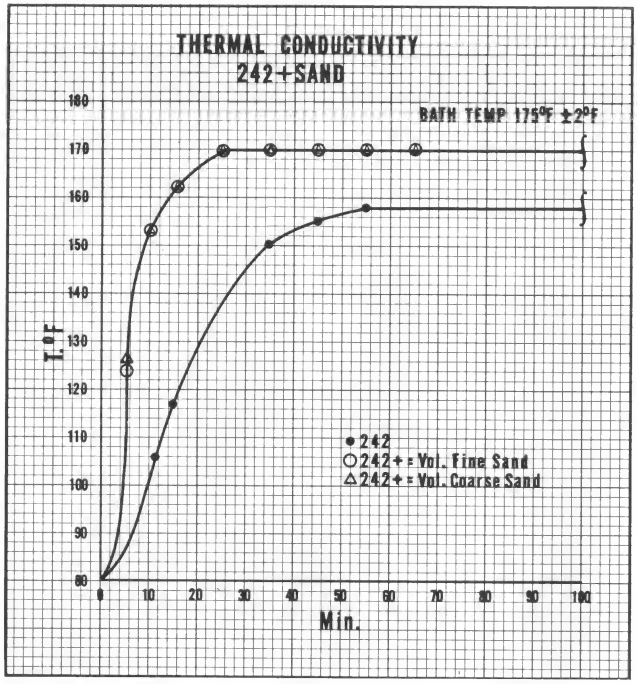
The electrical properties of cured DPR Compounds are comparable to those exhibited by most epoxies. The volume resistivity is in the range of 1.3×10^{13} and the dielectric strength in the area of 380 volts/mil. The dielectric constant and dissipation factor are also within desirable limits. Specific figures are given for each DPR Compound.

THERMAL CONDUCTIVITY:

The thermal conductivity of DPR Compounds is —

3.175×10^{-4} cal./sec./sq. cm./cm./°C. or
2.56 BTU/sq. ft./hr./°F./in.

For convenient comparison this conductivity is similar to that exhibited by an unfilled castable epoxy. It is outstandingly better than the conductivity of the other widely used elastomers, the polysulfides and silicones. If required, the thermal conductivity of DPR Compounds can be increased by adding appropriate fillers including sand.



MUFFLES HIGH FREQUENCY "WHINE":
Potting electrical components in DPR Compounds muffles annoying high frequency noise. This has been accomplished with 3 kc fluorescent lighting ballasts and 1 kc toroidal type DC to DC converter transformers.

WATER ABSORPTION:
DPR Compounds immersed in water for 22 hours @ 23°, (ASTM — D 570) show exceedingly little water absorption for a soft elastomeric material. The average weight gain was only 0.5%.

ADHESION:
Like other elastomers in its class, pourable DPR Compounds do not exhibit actual adhesion to other materials but rather a strong "cling" that forms a high integrity seal against liquids and gases. This "cling" improves with aging. If good adhesion is a requirement, primers are available for surfaces such as glass, wood, aluminum, steel, copper, etc. Recommendations will be made dependent upon the DPR Compound to be used and the surface it must adhere to.

CHEMICAL RESISTANCE AND AGING:
These properties are similar to natural rubber. This means excellent resistance to acids, bases, alcohols, etc., but poor resistance to petroleum based chemicals. DPR Compounds weather better and exhibit better ozone resistance than many conventionally produced rubbers.

ABRASION RESISTANCE AND TENSILE STRENGTH:
These are considerably lower than conventionally processed rubbers. However, they are well suited for applications where the DPR is not required to provide major structural strength.

DEAERATING:
To avoid air bubbles in the mixture it is desirable to mix under vacuum or apply vacuum after mixing. Since vigorous mixing can beat in a sizeable volume of air, choose a container that is at least 3 or 4 times the volume of DPR to prevent "boiling over" when deaerating. Mixing under vacuum is the preferred procedure.

Many very acceptable DPR molds are made without using vacuum techniques. Understandably, the procedure you select to follow depends upon the configuration of the pattern and the critical nature of the reproduction.

LOWERING THE VISCOSITY:
The room temperature viscosity of the castable DPR Compounds range from 20,000 cps to 40,000 cps. Although this provides adequate pourability for most applications, the viscosity can be lowered by preheating the Part A to between 100° and 140° F. prior to adding the curing agent (Part B). Then

mix as normal but anticipate reduced pot life. Here is a case where reducing the standard curing agent ratio will help offset the heat accelerated cure time.

SHELF LIFE:
Unmixed DPR Compounds and curing agents have excellent shelf life and are stable when stored in a cool area. Storing in warm areas can induce mild settlement. Reactivity is not impaired by settlement as long as both components are thoroughly stirred prior to weighing and using.

DUROMETER (CURED HARDNESS):
The DPR Compounds discussed here generally yield a rather soft rubber with a hardness in the Shore A 20 to 30 range. This hardness can be increased by approximately 5 to 10 points by using up to a 50% excess of curing agent (Part B) when preparing the mixture. This will also shorten the pot life and accelerate the cure. When making these adjustments, it is recommended that you experiment with various combinations of mixtures to find the one most suitable to your application. By reverse technique, using less than the standard ratio of curing agent (Part B) will create a softer final product by about 5 to 10 points. Never use less than one-half of the recommended standard ratio of curing agent to base rubber (Part A).

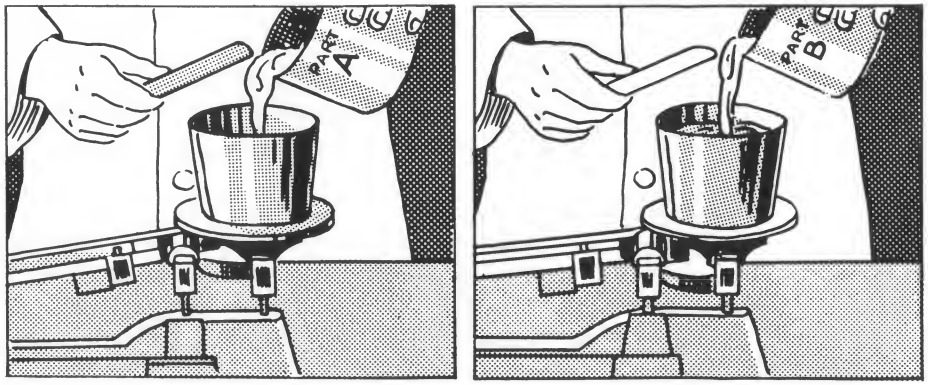
COLOR:
The natural colors of DPR Compounds range from light tan to chocolate brown. The brown compound can be readily made black by adding 4 parts by weight chemically pure Lampblack available from us. This addition has negligible effect on the electrical or physical properties.

NON-SAGGING FORMULATION:
Non-sagging or thixotropic formulations can be created by blending fillers like Cab-O-Sil in with the Part A of the "pourable" DPR Compounds. A thixotropic version of Compound #242 is available (# 242T).

FUNGUS RESISTANCE:
Tests show that DPR Compounds are resistant to fungal growth. Four species were selected. These are itemized as follows:

Chaetomium globosum	ATCC #6205
Aspergillus niger	ATCC #6275
Aspergillus terreus	ATCC #10690
Penicillium citrinum	ATCC #9112

The inoculated specimens were incubated for 21 days at 30°C. At the end of this period there was no visual evidence of fungal growth. The tests were conducted by the International Testing Laboratories, Inc., Newark, New Jersey.



DPR COMPOUND #242
HOW TO USE

CASTABLE RUBBER POLYMER

MIXING RATIO BY WEIGHT

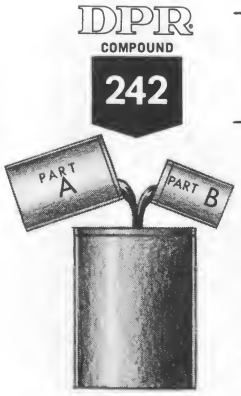
	Part A	Part B
Standard	100	8
Accelerated Cure	100	9 to 12
Extended Pot Life	100	4* to 7

*When using only 4 or 5 Parts B, a low heat cure is recommended because the room temperature curing period may be unduly lengthy for most applications.

TYPICAL POT LIFE AND CURING CHARACTERISTICS

Pot life or work life is the period over which a freshly prepared mixture remains *pourable* or *self-levelling*. This is shortened when the ambient temperature is warm and lengthened by cold. Although there is very little exotherm, pot life is shortened by the frictional heat generated while mixing large amounts.

Mixing Ratio	Room Temperature Cure	Cured @ 140° F.
Standard (100:8)	16 hours	4 hours
Accelerated (100:12)	8 hours	2 hours
Extended (100:4)	30 hours	16 hours



HINT FOR EXTENDING POURABILITY TIME:

Prepare the DPR Compound mixture using the extended pot life ratio (4 to 6 parts B per 100 parts A). Then after the castings are poured, cure at 140° F.

HINT FOR REDUCING VISCOSITY:

Preheat the Part A to 140° F. then add the Part B in accordance with the extended pot life ratio.

PHYSICAL AND ELECTRICAL PROPERTIES

	Original Physicals	After 24 hrs. @ 158° F.	After 72 hrs. @ 158° F.
Tensile psi	160	130	206
Modulus 100%	160	130	—
% Elongation	200	100	95
Durometer "Shore A"	28	42	62
% Set at Break	0	0	4

Color — Medium Brown
Viscosity (uncured) — 20,000 cps to 30,000 cps.

Water Absorption (ASTM-D 570)
After 22 hrs. in H_2O at 23° C. 0.5%

Temperature Effects
Remains flexible down to −75° C. (−103° F.) Not recommended for applications requiring prolonged resitance to temperatures above 180° F. Has tendency to shrink and/or harden with heat stress.

Volume Resistivity
(ASTM-D 257-61) 1.3×10^{13} ohm-centimeters

Dielectric Constant
(ASTM-D 150-597) @ 60 cps 4.1
@ 1000 cps 4.1
@ 1 mcps 4.0

Dissipation Factor
(ASTM-D 150-59T) @ 60 cps 0.007
@ 1000 cps 0.0052
@ 1 mcps 0.0073

Dielectric Strength
(ASTM-D 149-61) 380 volts/mil

CONVENIENT MIXING PROPORTIONS IN TERMS OF POUNDS & OUNCES

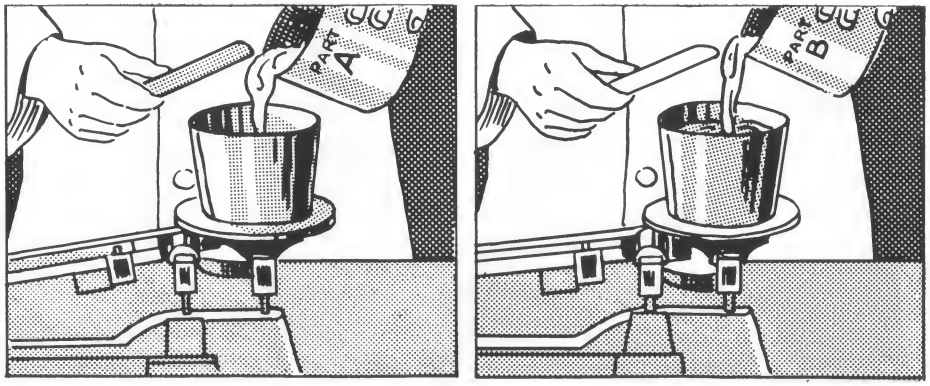
(to the nearest ¼ oz.)

Select an amount for mixing that you can comfortably use up during the pot life or work life of this material in accordance with the data presented herewith. Please remember that the pot life will be shortened at higher temperatures and lengthened at lower temperatures, as well as vary with mass and mixing techniques.

PART A	PART B		
(100 parts)	(8 parts) Standard Ratio	(12 parts) Accelerated Cure Ratio	(4 parts) Extended Pot Life
0 lb. 14¼ oz.	1 oz.	1½ oz.	½ oz.
1 lb. 8 oz.	2 oz.	3 oz.	1 oz.
2 lb.	2½ oz.	3¾ oz.	1¼ oz.
3 lb.	3¾ oz.	5½ oz.	1¾ oz.
4 lb.	5 oz.	7½ oz.	2½ oz.
5 lb.	6¼ oz.	9½ oz.	3¼ oz.
6 lb.	7½ oz.	11¼ oz.	3¾ oz.
7 lb.	8¾ oz.	13¼ oz.	4½ oz.
8 lb.	10 oz.	15 oz.	5 oz.
9 lb.	11¼ oz.	17 oz.	5¾ oz.
10 lb.	12½ oz.	18¾ oz.	6¼ oz.
11 lb.	14¼ oz.	21¼ oz.	7 oz.
12 lb.	15 oz.	22½ oz.	7½ oz.
13 lb.	15¾ oz.	24 oz.	8 oz.

If proportioning by weight is too inconvenient, use the following "by volume" ratio. Understandably, this is not as accurate as "by weight," but it should be adequate for many applications.

	Part A	Part B
Standard ratio	15 volumes	1 volume
Accelerated	10 to 12 volumes	1 volume
Extended pot life ratio	20 to 30 volumes	1 volume



CASTABLE RUBBER POLYMER

MIXING RATIO BY WEIGHT

	Part A	Part B
Standard	100	12
Accelerated Cure	100	14 to 18
Extended Pot Life	100	* 6 to 10

*When using only 6 to 8 parts B, a low heat cure is recommended because the room temperature curing period may be unduly lengthy for most applications.

TYPICAL POT LIFE AND CURING CHARACTERISTICS

Pot life or work life is the period over which a freshly prepared mixture remains *pourable* or *self-leveling*. This is shortened when the ambient temperature is warm and lengthened by cold. Although there is very little exotherm, pot life is shortened by the frictional heat generated while mixing larger amounts.

Mixing Ratio	R T Cured	Cured at 140° F.
Standard (100:12)	16 hours	4 hours
Accelerated (100:18)	8 hours	2 hours
Extended (100:6)	30 hours	16 hours

HINT FOR EXTENDING POURABILITY TIME:

Prepare the DPR compound mixture using the extended pot life ratio (6 to 10 parts B per 100 parts A). Then after the castings are poured, cure at 140° F.

HINT FOR REDUCING VISCOSITY:

Preheat the Part A to 140° F., then add the Part B in accordance with the extended pot life ratio.

PHYSICAL AND ELECTRICAL PROPERTIES

	Original Physicals	After 24 hrs. @ 158° F.	After 72 hrs. @ 158° F.
Tensile psi	120	130	160
Modulus 100%	120	100	154
% Elongation	280	240	240
Durometer "Shore A"	20	22	24
% Set at Break	0	0	1

Color — Tan
Viscosity (uncured) — 20,000 cps @ 74° F.

Water Absorption (ASTM-D 570)
After 22 hrs. in H_2O at 23° C. 0.7%

Temperature Effects
Remains flexible down to −75° C. (−103° F.)
Will tolerate temperatures to 80° C. (180° F.) for prolonged periods without undue hardening.

Volume Resistivity
(ASTM-D 257-61) 7×10^{12} ohm-centimeters

Dielectric Constant

(ASTM-D 150-597)	@ 60 cps	3.8
	@ 1000 cps	3.8
	@ 1 mcps	3.6

Dissipation Factor

(ASTM-D 150-59T)	@ 60 cps	0.007
	@ 1000 cps	0.0073
	@ 1 mcps	0.012

Dielectric Strength
(ASTM-D 149-61) 280 volts/mil

CONVENIENT MIXING PROPORTIONS IN TERMS OF POUNDS & OUNCES

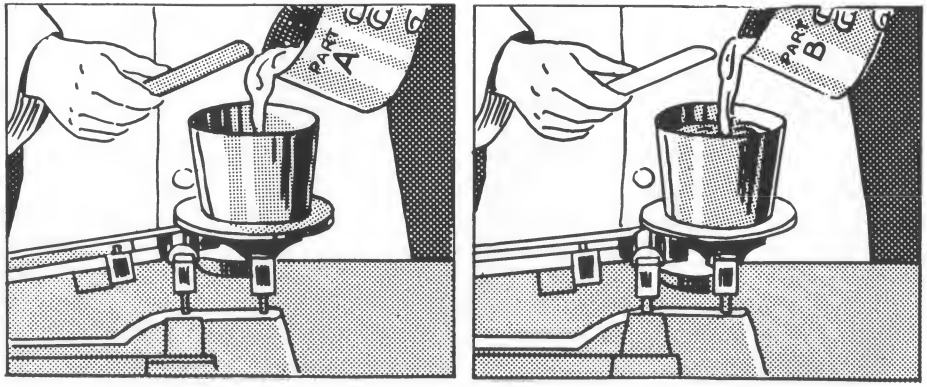
(to the nearest ¼ oz.)

Select an amount for mixing that you can comfortably use up during the pot life or work life of this material in accordance with the data presented herewith. Please remember that the pot life will be shortened at higher temperatures and lengthened at lower temperatures, as well as vary with mass and mixing techniques.

PART A	PART B		
(100 parts)	(12 parts) Standard Ratio	(18 parts) Accelerated Cure Ratio	(6 parts) Extended Pot Life
0 lb. 8½ oz.	1 oz.	1½ oz.	½ oz.
1 lb. 1 oz.	2 oz.	3 oz.	1 oz.
2 lb. 2 oz.	4 oz.	6 oz.	2 oz.
3 lb. 3 oz.	6 oz.	9 oz.	3 oz.
4 lb. 4 oz.	8 oz.	12 oz.	4 oz.
5 lb. 5 oz.	10 oz.	15 oz.	5 oz.
6 lb. 6 oz.	12 oz.	1 lb. 2 oz.	6 oz.
7 lb. 7 oz.	14 oz.	1 lb. 5 oz.	7 oz.
8 lb. 8 oz.	1 lb.	1 lb. 8 oz.	8 oz.
9 lb. 9 oz.	1 lb. 2 oz.	1 lb. 11 oz.	9 oz.
10 lb. 10 oz.	1 lb. 4 oz.	1 lb. 14 oz.	10 oz.
11 lb. 11 oz.	1 lb. 6 oz.	2 lb. 1 oz.	11 oz.

If proportioning by weight is too inconvenient, use the following "by volume" ratio. Understandably, this is not as accurate as "by weight," but it should be adequate for many applications.

	PART A	PART B
Standard ratio	12 volumes	1 volume
Accelerated	8 to 10 volumes	1 volume
Extended pot life ratio	14 to 24 volumes	1 volume



DPR COMPOUND #336

HOW TO USE

CASTABLE RUBBER POLYMER

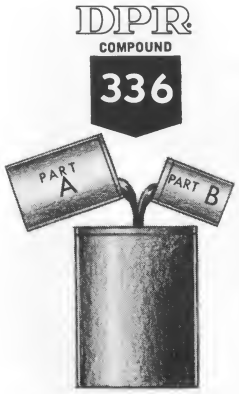
MIXING RATIO BY WEIGHT

	Part A	Part B
Standard	100	17
Accelerated Cure	100	18-25
Extended Pot Life	100	* 9-16

*When using only 9 to 12 parts B, a low heat cure is recommended because the room temperature curing period may be unduly lengthy for most applications.

TYPICAL POT LIFE AND CURING CHARACTERISTICS

Pot life or work life is the period over which a freshly prepared mixture remains *pourable* or *self-levelling*. This is shorter when the ambient temperature is warm and lengthened by cold. Although there is very little exotherm, pot life is shortened by the frictional heat generated while mixing larger amounts.



Typical Cure Schedule
DPR COMPOUND #336

Mixing Ratio	R T Cured	Cured at 140°F.
Standard (100:12)	16 hours	4 hours
Accelerated (100:18)	8 hours	2 hours
Extended (100:6)	30 hours	16 hours

HINT FOR EXTENDING POURABILITY TIME:

Prepare the DPR compound mixture using the extended pot life ratio (6 to 10 parts B per 100 parts A). Then after the castings are poured, cure at 140° F.

HINT FOR REDUCING VISCOSITY:

Preheat the Part A to 140° F., then add the Part B in accordance with the extended pot life ratio.

PHYSICAL AND ELECTRICAL PROPERTIES

	Original Physicals	After 24 hrs. @ 158° F.	After 72 hrs. @ 158° F.
Tensile psi	110	120	180
Modulus 100%	110	100	100
% Elongation	250	240	250
Durometer "Shore A"	25	26	27
% Set at Break	1	1	1

Color — Light Tan

Viscosity (uncured) — 30,000 cps to 40,000 cps.

Water Absorption (ASTM-D 570)

After 22 hrs. in H_2O at 23° C. 0.5%

Temperature Effects

Remains flexible down to −75° C. (−103° F.)
Will tolerate temperatures to 80° C. (180° F.) for prolonged periods without undue hardening.

Volume Resistivity

(ASTM-D 257-61) 1.4 x 10^{13} ohm-centimeters

Dielectric Constant

(ASTM-D 150-597)	@ 60 cps	4.2
	@ 1000 cps	4.2
	@ 1 mcps	3.9

Dissipation Factor

(ASTM-D 150-59T)	@ 60 cps	0.013
	@ 1000 cps	0.0097
	@ 1 mcps	0.016

Dielectric Strength

(ASTM-D 49-61) 360 volts/mil

CONVENIENT MIXING PROPORTIONS IN TERMS OF POUNDS & OUNCES

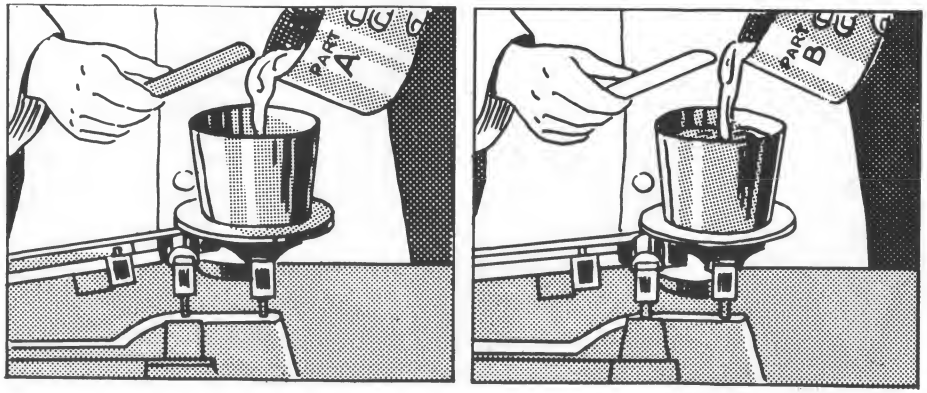
(to the nearest ¼ oz.)

Select an amount for mixing that you can comfortably use up during the pot life or work life of this material in accordance with the data presented herewith. Please remember that the pot life will be shortened at higher temperatures and lengthened at lower temperatures, as well as vary with mass and mixing techniques.

PART A	PART B		
(100 parts)	(17 parts) Standard Ratio	(25 parts) Accelerated Cure Ratio	(9 parts) Extended Pot Life
0 lb. 6 oz.	1 oz.	1½ oz.	½ oz.
0 lb. 12 oz.	2 oz.	3 oz.	1 oz.
1 lb. 2 oz.	3 oz.	4½ oz.	1½ oz.
3 lb. 0 oz.	8 oz.	12 oz.	4 oz.
4 lb. 2 oz.	11 oz.	16½ oz.	6 oz.
5 lb. 4 oz.	14 oz.	1 lb. 5 oz.	7 oz.
6 lb. 0 oz.	16 oz.	1 lb. 8 oz.	8 oz.
7 lb. 2 oz.	1 lb. 3 oz.	1 lb. 12 oz.	10 oz.
8 lb. 4 oz.	1 lb. 6 oz.	2 lb. 1 oz.	11 oz.
9 lb. 0 oz.	1 lb. 8 oz.	2 lb. 4 oz.	12 oz.
10 lb. 2 oz.	1 lb. 11 oz.	2 lb. 8 oz.	14 oz.
11 lb. 4 oz.	1 lb. 14 oz.	2 lb. 12 oz.	15 oz.

If proportioning by weight is too inconvenient, use the following "by volume" ratio. Understandably, this is not as accurate as "by weight," but it should be adequate for many applications.

	PART A	PART B
Standard ratio	9 volumes	1 volume
Accelerated	6 to 8 volumes	1 volume
Extended pot life ratio	10 to 18 volumes	1 volume



Heat Cured Compound

DPR® COMPOUND #7102

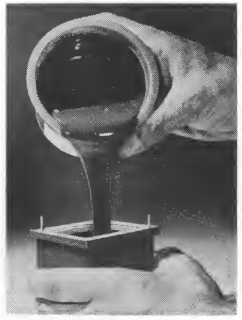
Compound #7102 is a "ready to pour", one-part liquid rubber polymer that cures to a flexible rubber when heated at 275°F. to 300°F. The heating period ranges from 15 to 60 minutes depending upon section thickness. When cured and cooled, Compound #7102 exhibits outstanding dimensional stability, excellent electrical properties and good resistance to heat, acids, alkalis and alcohols.

FOR ELECTRICAL POTTING AND ENCAPSULATION

Compound #7102 is recommended where heat resistance to 300° F. is required. It remains flexible at temperatures down to −75° C. Typical electrical properties are: volume resistivity, 1.3 x 10^{13} ohm-centimeters; dielectric strength, 380 volts/mil; dielectric constant, 4.1 @ 60 cps and dissipation factor, 0.007 @ 60 cps.

When using heat curing DPR #7102, consideration should be given to the fact that traces of sulphur are released during cure which might discolor exposed copper or silver contact surfaces. (DPR room temperature curing compounds do not contain sulphur.)

DPR COMPOUND 7102



FOR FLEXIBLE MOLDS:

Compound #7102 is an ideal, low cost mold material for casting gypsums, epoxies, urethanes, polyesters, waxes, low melting point metals, etc. It demonstrates desirable dimensional stability and flexibility. Appropriate mold releases should be used in accordance with regular procedures.

FOR POURED GASKETS:

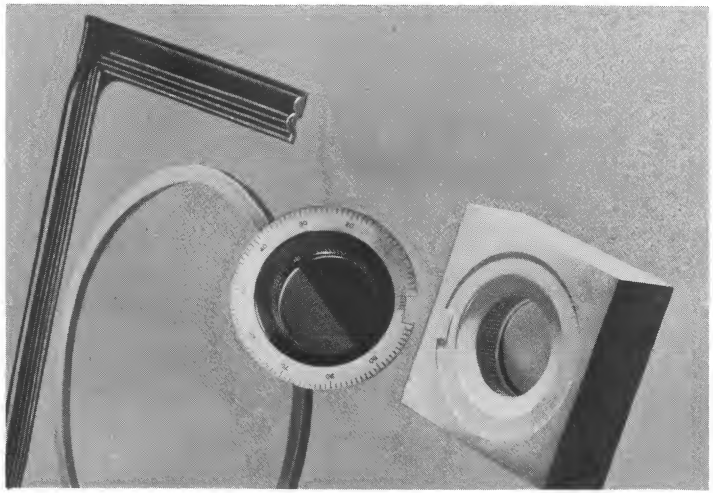
Compound #7102 is a convenient to use gasket material where the environmental and chemical resistance requirements can be met by an isoprene or natural rubber. This compound is self-leveling prior to cure and exhibits good compression set characteristics when in use.

WORKING PROPERTIES:

The viscosity at room temperatures is 30,000 to 40,000 cps. This viscosity is pourable enough for most applications. If it is too viscous for a specific case, the DPR Compound can be heated to 160°F prior to pouring. This drops the viscosity to 12,000 cps. At this temperature it provides a work or pot life of 3 hours. Typical hardness cure is Shore A 40. The shelf life when stored cool is four months. The weight per gallon is 12.45 pounds.

ADHESION:

Heat cured DPR #7102 exhibits fair adhesion to most surfaces. Available primers can upgrade the adhesion to excellent. The use of mold releases are recommended when adhesion is not desired. Any commercially available silicone or teflon base releases are useable with DPR.



DPR® CASTABLE RUBBER POLYMER for PRECISE FLEXIBLE MOLDS with...

COMPOUND # 336

- ***EXCELLENT DETAIL***
- ***UNSURPASSED DIMENSIONAL STABILITY and***
- ***GREATLY REDUCED COST***

ROOM TEMPERATURE CURING DPR COMPOUND #336 IS HELPING MOLDMASTERS MAKE BETTER FLEXIBLE MOLD CASTINGS MORE EASILY AND AT LESS COST.

EXCELLENT DETAIL: Despite an apparent higher initial viscosity, DPR Compound #336 exhibits an inherent wetting characteristic that penetrates more completely into finely detailed patterns than most of the thinner liquid elastomers. This wetting action can even be further enhanced with the use of a special pattern surface wettant. More than penetration, its use helps to avoid air entrapment at the mold surface when making the pour.

UNSURPASSED DIMENSIONAL STABILITY This phrase has been carefully worded because it is known that all elastomeric materials regardless of claim or cost are subject to some degree of dimensional change under stresses of time or temperature. The commonly used statement "negligible shrinkage" can mean different things to many users. Based on actual customer experience, DPR Compound #336 is meeting such critical requirements as less than one mil variation in a fourteen inch casting. In this application mold temperatures do not exceed 110°F; sustained higher temperatures will induce a greater variance. The costly polysulfide rubbers and the costlier silicones are no better for low and moderate temperature applications although the silicones must be recognized superior for sustained high temperature procedures.

LOW COST DPR Compound #336 is advantageously priced at 4¢ a cubic inch or $9.25 a mixed gallon (Part A plus Part B — Please see "Ordering Information"). This not only permits substantial savings but also allows wider usage of flexible mold casting techniques and/or less need for time consuming layup procedures to minimize the volume of rubber required.

Some users are also reporting savings in material and labor since DPR Compound #336 is yielding more castings per mold than other mold materials.

HOW TO USE DPR COMPOUND #336

Basically the technique for using this DPR Compound is very similar to that employed in handling castable polysulphide and silicone rubbers.

Patterns are prepared in the usual manner. Originals may be of plaster, wood, glass, clay, plastic, soap, metal or wax. Since the DPR rubber polymer reproduces very minute detail, care should be taken to eliminate dirt or foreign matter with particular attention to crevices and undercuts.

A parting agent is usually required with DPR. There is good chance that the moldmaker can continue to use his present mold release. This can be a detergent solution, silicone or teflon liquids and aerosols, wax, vaseline, polyvinyl alcohol (PVA), etc.

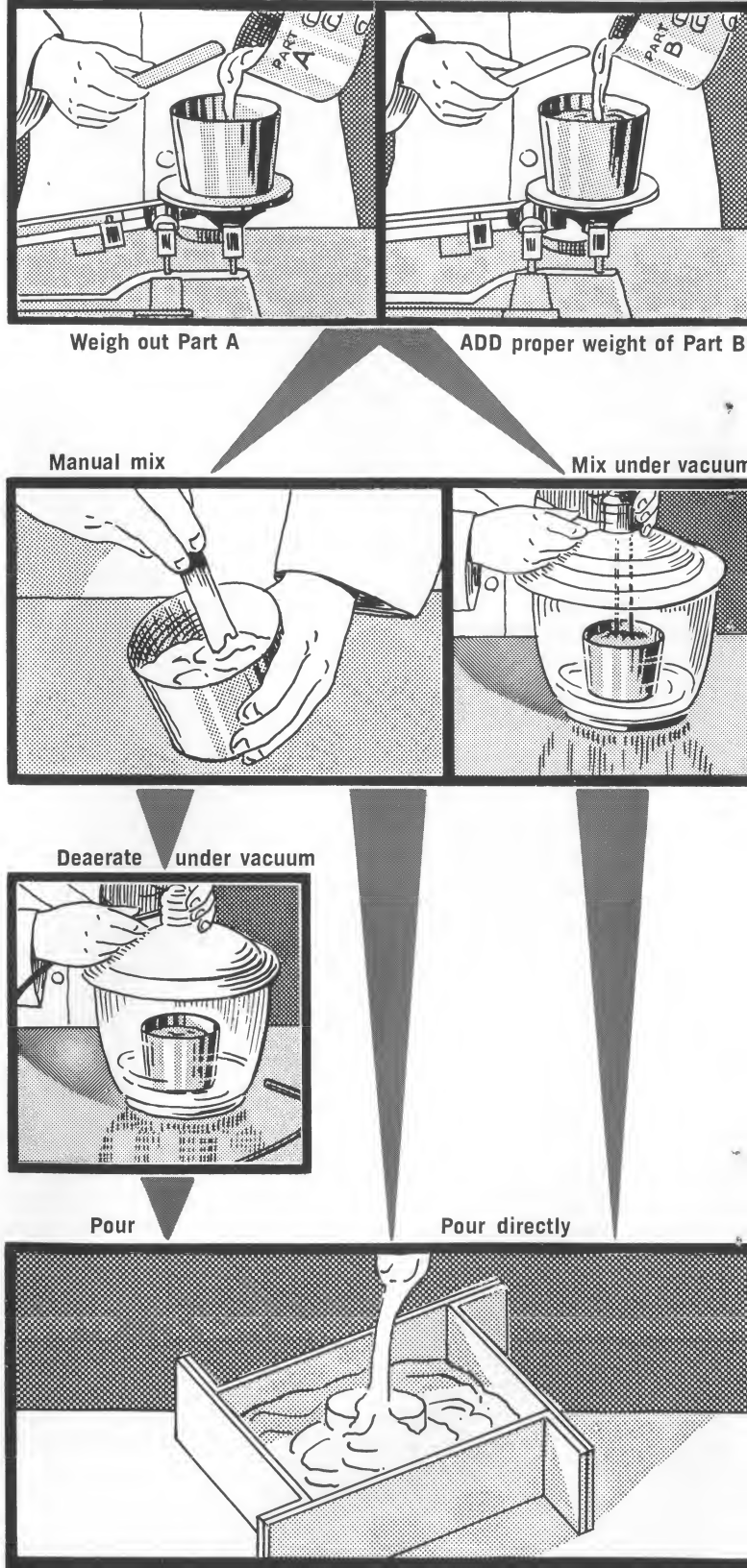
After the parting or release agent is applied to the pattern, the moldmaker has the option of applying a "wetting" film to improve penetration and minimize air entrapment. It is pointed out that the use of a wetting material is not a requirement with DPR, but rather a technique that may make a better mold regardless of which mold material is being used. DPR, Inc. supplies a wetting agent that is one of the basic ingredients in their rubber polymer compound; it migrates into the DPR as the DPR cures. In use, the wetting agent is brushed onto the pattern and blown over lightly with an air hose. The air distributes it evenly over all surfaces and removes excess accumulation in corners or crevices. The wetting agent evaporates slowly and can be applied several hours before pouring the mold.

The "box" surrounding the pattern should also be coated with a release agent. The DPR mixture is poured into a corner of the box allowing the DPR to rise around the pattern. Conventional foundry pouring techniques seem to work well with DPR Compounds.

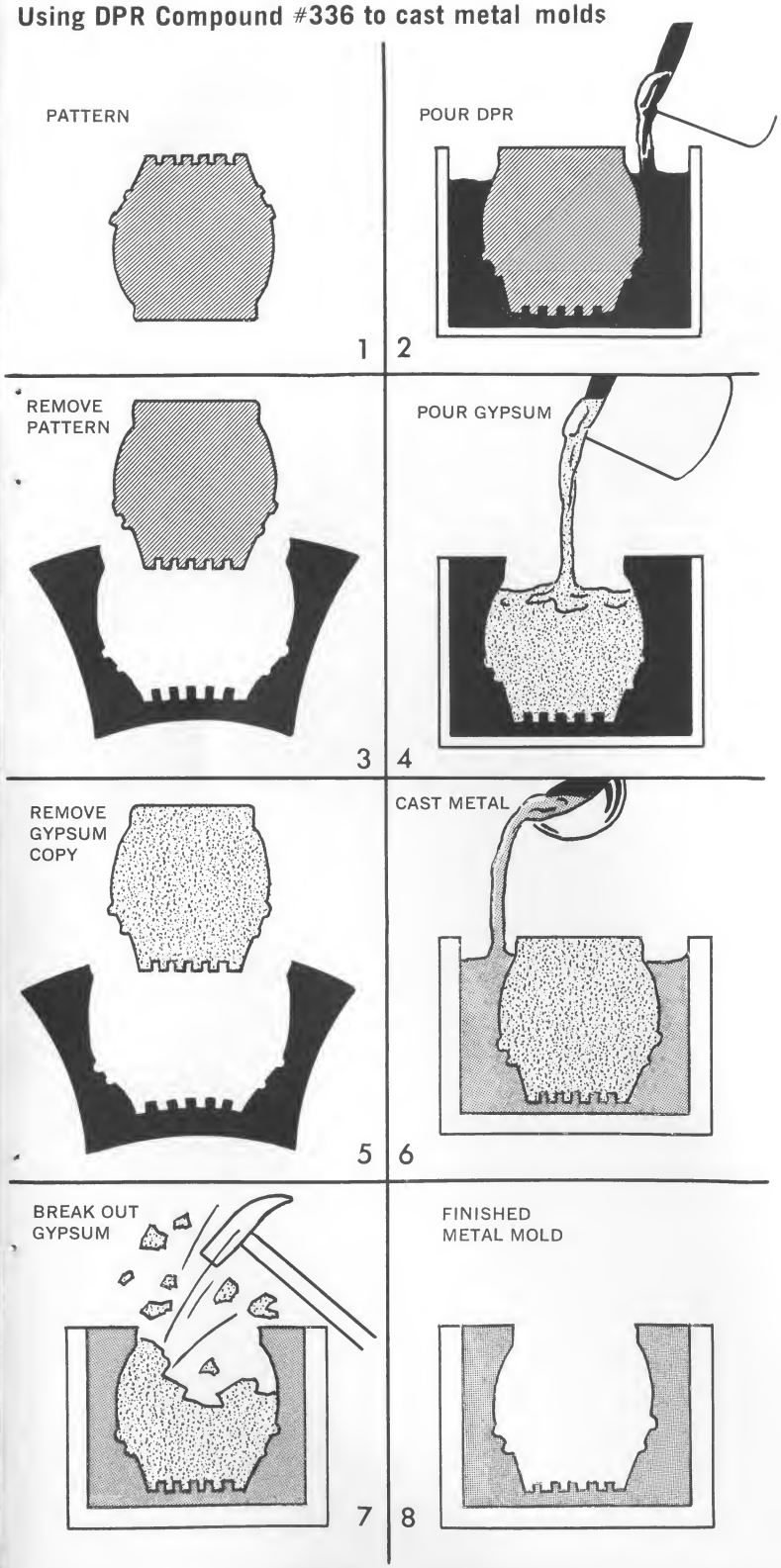
PREPARING THE DPR MIXTURE Room temperature curing DPR Compound #336 is a two-part mixture consisting of the basic rubber compound (Part A) and the curing agent (Part B). To prepare a mixed batch, weigh out the appropriate amounts of Parts A and B. The recommended ratio is 100 parts A to 17 parts B by weight. These proportions are given on the container labels. Although it is good practice to weigh out these parts accurately, the mixing ratio is not critical. You can reduce the recommended amount of curing agent by as much as 50% and still achieve a good cure. By the same token you can successfully use more than the recommended amount. However, varying the amount of curing agent will alter pot life, cure time and vary the final cured hardness by as much as 10 points on the Shore A durometer scale. Thorough mixing is very important so as not to end up with uncured material in your mold. The color contrast between Part A (white) and Part B (brown) is a good indication to assure proper mixing.

Avoid light or dark streaks in the mixture. Do not scrape unmixed material from the sides of the container into the mold.

To avoid air bubbles in the mixture it is desirable to mix under vacuum or apply



Using DPR Compound #336 to cast metal molds



vacuum after mixing. Since vig mixing can beat in a sizeable volu air, choose a container that is at le or 4 times the volume of DPR to vent "boiling over" when deaera Mixing under vacuum is the pref procedure.

Many very acceptable DPR mold made without using vacuum techni Understandably, the procedure yo lect to follow depends upon the co ration of the pattern and the cr nature of the reproduction.

POT-LIFE AND CURING DPR Comp #336 is formulated to provide a minute pot or work life at 75°F. (a standard 100:17 ratio of Parts A t Reducing the amount of the Part E ing agent will increase work life shorten cure time. An increase in perature will shorten work life an celerate curing. Many users len their work life by reducing the P ratio to 12 parts per hundred and erate the cure by applying low hea to 140°F.) or curing overnight heated room (80°F. - 90°F.). DPR pound #336 at standard cure rati pph Part B) will cure overnig 75°F.

SURFACE TACK DPR surfaces ex to air during cure may exhibit surface tack. The degree of surfac or its absence can depend upon c rate. Slow cure, induced by usin than the standard curing agent (or curing at a relatively cool tem ture) will increase tack. On the hand, accelerated curing with an e of curing agent or the use of hea

ORDERING INFORMATION

DPR Compound #336

The prices for DPR compounds are worked out to provide complete information for all aspects of engineering and purchasing. For engineering consideration, we show volumes and costs per volume. For purchasing consideration, we give weights per volume and costs per pound.

For example: Each kit contains one gallon of rubber polymer (Part A) and the appropriate amount of curing agent (Part B). When mixed, these kits make considerably more than one gallon of cured DPR. Therefore, the kit cost will be greater than the "per gallon cost", which is also given for estimating and comparison purposes. For your further convenience, kit volumes are converted into cubic inches and cost per cubic inch.

KITS

(One gallon Part A plus Part B)

Price/lb. — 80c

Kit weight		Kit Volume/Gal.	
Part A	11 lbs. 0 oz.	Part A	1.000
Part B	1 lb. 14 oz.	Part B	0.117
TOTAL	12 lbs. 14 oz.	TOTAL	1.117
Kit Volume (Cubic Inches)	260	Cost/Cubic In.	4¢
Mixed Cost/Gal. (231 Cubic In.)	$9.25	Purch Price/Kit	$10.35
		Minimum Order*	3 Kits

*Single Introductory Kits Based on One-Gallon Part A will be shipped on a prepaid basis. Please submit check for $12.85 ($10.35 for the kit plus $2.50 for handling and shipping).

BULK

5-Gallon pails (Part A) plus Part B	80¢/lb.
30-Gallon drum (Part A) plus Part B	79¢/lb.
55-Gallon drum (Part A) plus Part B	78¢/lb.
3 X 55-Gallon drums (Part A) or 6 X 30-Gallon drums (Part A) plus Part B	75¢/lb.**
5 X 55-Gallon drums (Part A) or 10 X 30-Gallon drums (Part A) plus Part B	70¢/lb.**

**One shipment — one destination.

WETTING AGENT

1 Quart $2.00 • 1 Gallon $6.00

Suggestion to Purchasing Agents: Please order in terms of the number of gallons Part A desired, specify container (gallon cans, 5-gallon pails, 30- or 55-gallon drums) — and then merely state "include appropriate amount of Part B". Parts A and B are priced the same per pound.

F.O.B. BELLEVILLE — TERMS: 1/1-10-N/30

vacuum after mixing. Since vigorous mixing can beat in a sizeable volume of air, choose a container that is at least 3 or 4 times the volume of DPR to prevent "boiling over" when deaerating. Mixing under vacuum is the preferred procedure.

Many very acceptable DPR molds are made without using vacuum techniques. Understandably, the procedure you select to follow depends upon the configuration of the pattern and the critical nature of the reproduction.

POT-LIFE AND CURING DPR Compound #336 is formulated to provide a 35-45 minute pot or work life at 75°F. (at the standard 100:17 ratio of Parts A to B). Reducing the amount of the Part B curing agent will increase work life and shorten cure time. An increase in temperature will shorten work life and accelerate curing. Many users lengthen their work life by reducing the Part B ratio to 12 parts per hundred and accelerate the cure by applying low heat (up to 140°F.) or curing overnight in a heated room (80°F. - 90°F.). DPR Compound #336 at standard cure ratio (17 pph Part B) will cure overnight at 75°F.

SURFACE TACK DPR surfaces exposed to air during cure may exhibit slight surface tack. The degree of surface tack or its absence can depend upon curing rate. Slow cure, induced by using less than the standard curing agent ratio (or curing at a relatively cool temperature) will increase tack. On the other hand, accelerated curing with an excess of curing agent or the use of heat will produce a tack free surface. If surface tack is a problem, dust the cured DPR with an inert powder such as talc, etc.

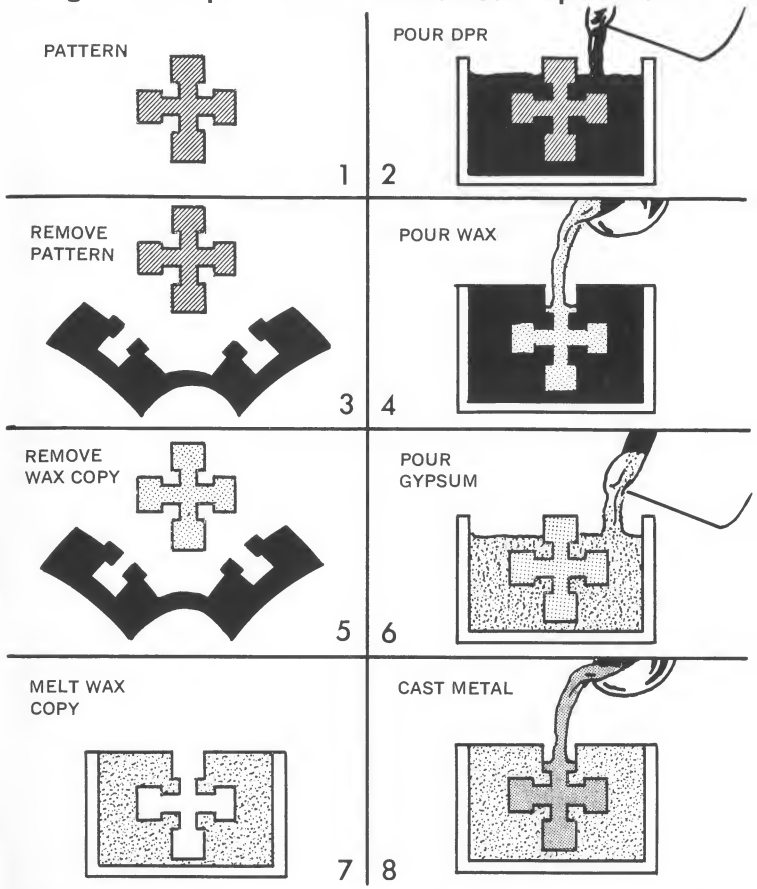
"PAINTING" THE PATTERN OR MODEL In some applications, before pouring the DPR around the model, it may be practical to first brush on a layer of the rubber. This is particularly useful when deaerating procedures are not followed. The brushing action physically eliminates trapped air bubbles at the critical surface where the mold contacts the model.

ADHESION If good adhesion is desired between the poured DPR and another material, the use of a primer is required. Since the various types of surfaces, such as steel, aluminum, plaster, concrete, etc. require different primers, it will be necessary to obtain our recommendations specifically for your application. This also applies to problems where a cured section of DPR is to be bonded to another material.

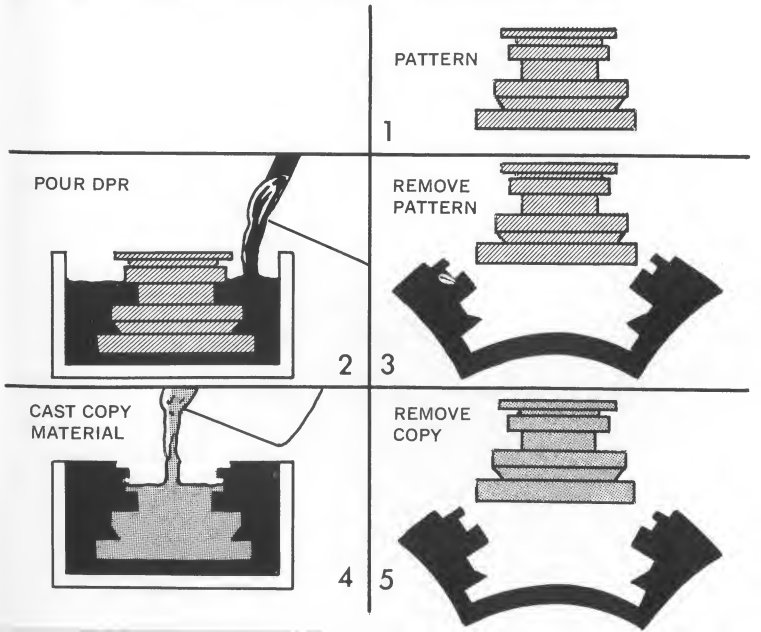
REINFORCING THE MOLD If considered necessary, the strength of DPR molds can be greatly increased by reinforcing constant flex points with an open weave fabric. A 20-25 mesh material is recommended. The area to be reinforced is first coated with a layer of uncured DPR, then the fabric is laid in and the DPR pour completed.

SHELF LIFE Unmixed DPR Compound #336 and its curing agent has excellent shelf life and is stable when stored in a cool area. Storing in warm areas can induce mild settlement. Reactivity is not impaired by settlement as long as both components are thoroughly stirred prior to weighing and using.

Using DPR Compound #336 to cast metal reproductions



Using DPR Compound #336 to cast Thermosetting materials or low melting point waxes, metals, plastics, etc.



Other DPR® Products

Two-Part, Room Temperature Curing

COMPOUND #242—Lowest price (3¢ a cubic inch). Medium brown color. Cured hardness - Shore A 30-40 . Good general purpose flexible mold material. Shrinkage characteristics not quite as good as those exhibited by Compound #336.

COMPOUND #249—Priced at 3½¢ a cubic inch. Most pourable (lowest viscosity @ 20,000 cps). Softer cure — Shore A 15-25. Very flexible with good heat aging and shrinkage characteristics.

One-Part, Heat Curing

COMPOUND #7102—"Ready to pour" rubber polymer that cures to flexible rubber when heated at 275°F. When cured and cooled, maintains excellent dimensional stability and readily resists temperatures to 300°F. Priced at $7.50 a gallon.

HARD RUBBER

Flowable one-part DPR Compounds which can be cured overnight at temperatures from 240°F to 275°F to a dense, solid hard rubber.

Equipment for Proportioning DPR Compounds and Other Two-Part Materials, such as, Epoxies, Urethanes and Polyesters

HARDMAN TRIPLEMATIC® TWO-PORTIONER

A turn of the crank dispenses the proper proportion of Parts A and B directly into the mixing container. Eliminates time consuming weighing out of each part, minimizes waste and human error. Recommended for intermittent, small to medium volume use.

HARDMAN TRIPLEMATIC® Machines

for automatic proportioning, mixing and dispensing.

This equipment supplies accurately proportioned and uniformly mixed material in precise shots or continuous flow. Recommended for long runs.

Please direct equipment inquiries to the H. V. HARDMAN CO., INC., TRIPLEMATIC Division, 600 Cortlandt Street, Belleville, New Jersey — Telephone: (201) 759-3700. (DPR, Inc. is a subsidiary of the H. V. Hardman Co., Inc.)

DPR INCORPORATED

A SUBSIDIARY OF THE **H.V. HARDMAN CO., INC.**

600 CORTLANDT ST. BELLEVILLE, N. J. 07109

Technique for Making Flexible Molds with DPR Compounds

Here is a suggested method for making stretchable or peelable flexible rubber molds with DPR. DPR Compounds are 100% solids, room temperature curing materials, that cure uniformly regardless of section thickness or exposure to air. This means that a flexible mold can be quickly prepared around complex patterns in one operation. This method will replace time consuming multilayer latex application techniques required by many pattern configurations. DPR will not replace every requirement for latex where the pattern needs the superior elongation characteristics of latex.

The series of cross-sectional drawings illustrate one easy method for preparing a flexible mold with DPR. You will see that this method utilizes a combination of a rigid and flexible molds. The rigid mold is prepared undersize so as to accommodate a flexible mold interface and then be the supporting structure when casting into the flexible mold. Dependent upon the pattern configuration, the rigid mold portion may be cast in one piece or several pieces. This rigid mold may be cast out of many materials. However, for this example it has been cast out of plaster heavily filled with sand to maximize economy.

PREPARING THE RIGID MOLD:

Take the pattern and apply to it a layer of material equivalent to the desired thickness of the flexible mold. In this example water soaked strips of paper were used. These strips were applied in crossed layers following the contours of the pattern until a minimum thickness of 1/4″ thickness to 3/8″ was attained. The pattern is then suspended in a box and the plaster mold material is poured. When hardened, the rigid mold is disassembled and the pattern removed.

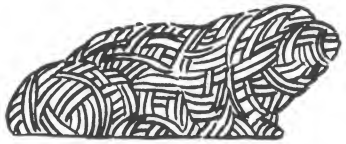
MAKING THE FLEXIBLE MOLD:

The paper layers are removed from the pattern. Mold release is applied to both the pattern and the rigid mold cavity. After suspending the pattern in the rigid mold, DPR is mixed and poured into the space between the rigid mold and the pattern. Please see the DPR mixing directions pertaining to the specific compound being used. After the DPR cures, the rigid mold is disassembled and the flexible mold removed from the pattern.

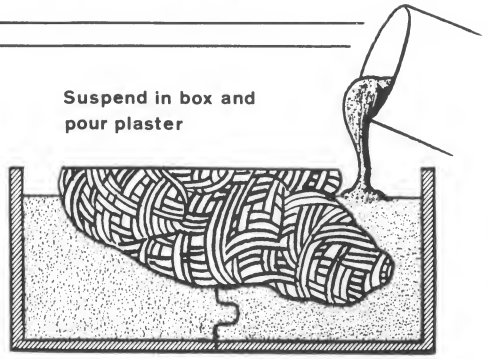
CASTING COPIES:

To cast copies, the rigid and flexible molds are reassembled and the flexible mold cavity coated with mold release. Copy materials such as gypsums, waxes, epoxies, polyesters, etc. can now be cast into the cavity. The copies are then removed similarly to the procedure for removing the original pattern.

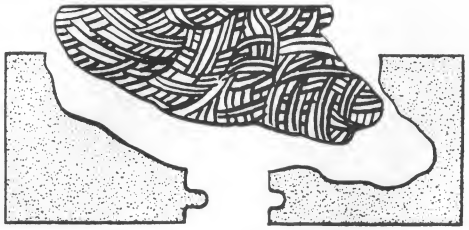
Pattern 1



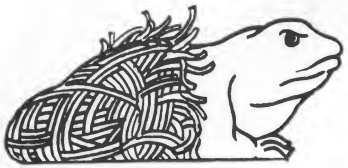
Build up with layers of water soaked strips of paper 2



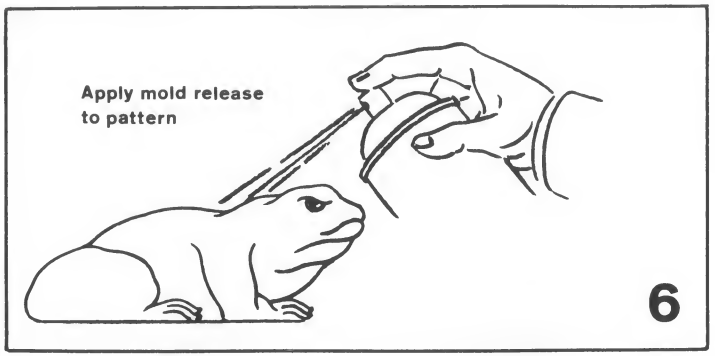
Suspend in box and pour plaster 3

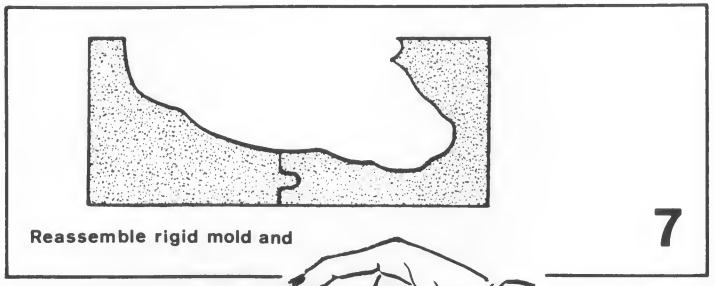


Remove built-up pattern 4

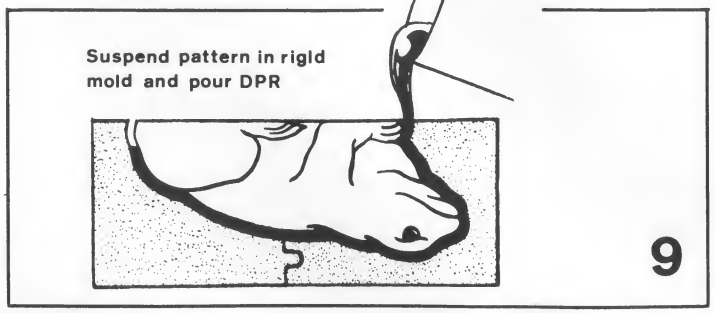


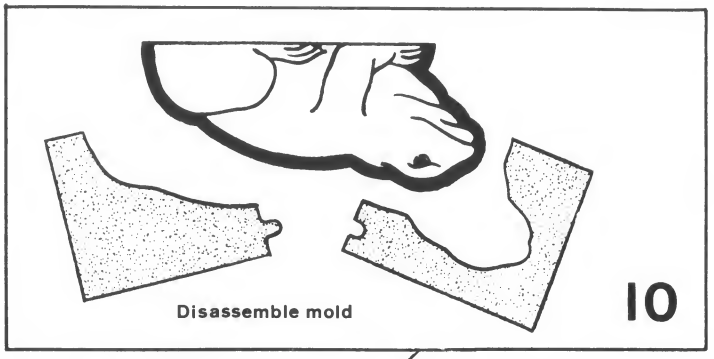
Remove paper layers 5

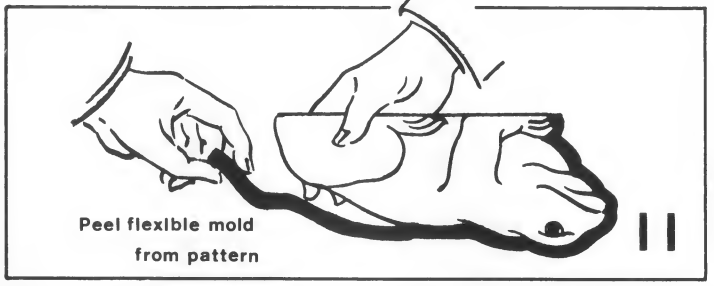

Apply mold release
to pattern
6

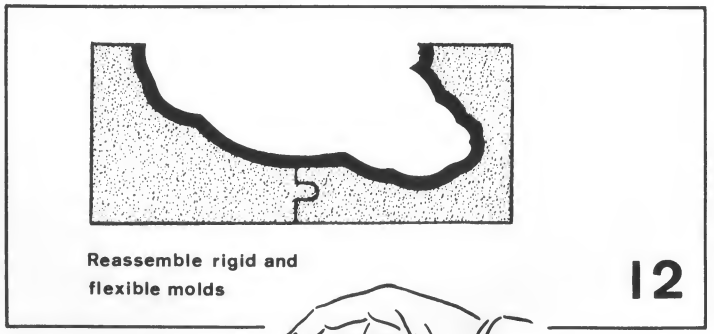

Reassemble rigid mold and
7

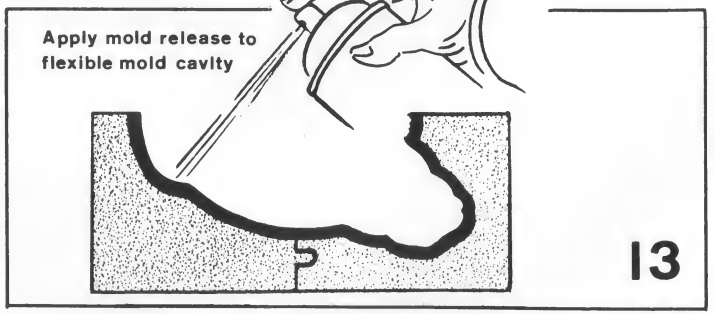

coat with mold release
8

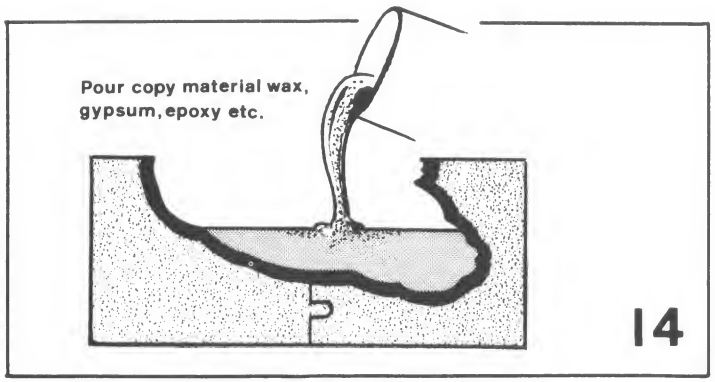

Suspend pattern in rigid
mold and pour DPR
9

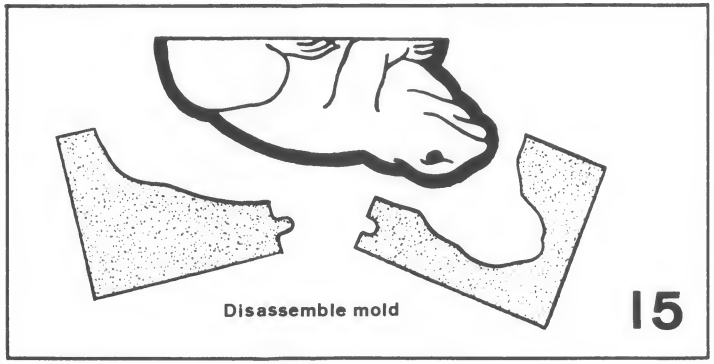

Disassemble mold
10

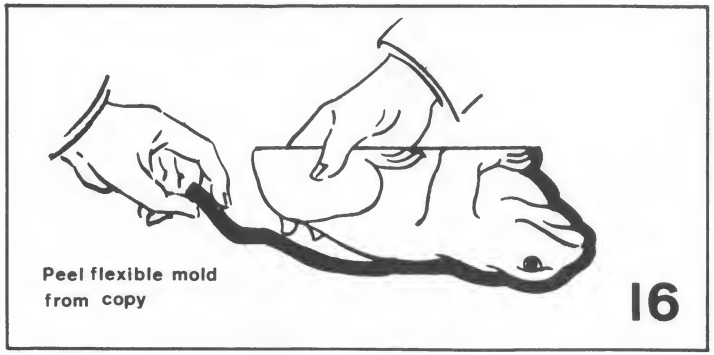

Peel flexible mold
from pattern
11


Reassemble rigid and
flexible molds
12


Apply mold release to
flexible mold cavity
13







SUGGESTED FLEXIBLE MOLD COMPOUNDS

DPR Compound #336 — Light tan color, excellent dimensional stability and detail reproduction.

DPR Compound #X7153 — New product, dark brown color, greater tensile strength and tear resistance than #336. Accelerated tests indicate comparable dimensional stability to #336, but no long term data yet available.

Prices: Compounds #336 or #X7153.

KITS

(One gallon Part A plus Part B)

Price/lb.—80¢

Kit weight		Kit Volume	Gal.
Part A	11 lbs. 0 oz.	Part A	1.000
Part B	1 lb. 14 oz.	Part B	0.117
TOTAL	12 lbs. 14 oz.	TOTAL	1.117
Kit Volume (Cubic Inches)	260	Cost/Cubic In.	4¢
Mixed Cost/Gal. (231 Cubic In.)	$9.25	Purch Price/Kit	$10.35
		Minimum Order*	3 Kits

*Single Introductory Kits Based on One-Gallon Part A will be shipped on a prepaid basis. Please submit check for $12.85 ($10.35 for the kit plus $2.50 for handling and shipping).

BULK

5-Gallon pails (Part A) plus Part B	80¢/lb.
30-Gallon drum (Part A) plus Part B	79¢/lb.
55-Gallon drum (Part A) plus Part B	78¢/lb.
3 x 55-Gallon drums (Part A) or 6 x 30-Gallon drums (Part A) plus Part B	75¢/lb.**
5 x 55-Gallon drums (Part A) or 10 x 30-Gallon drums (Part A) plus Part B	70¢/lb.**

**One shipment — one destination.

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DPR® RUBBER POLYMER COST GUIDE

	Compound #242		Compound #249		Compound #336	
	Less than ton @ 55¢/lb.	Ton* & over @ 48¢/lb.	Less than ton @ 70¢/lb.	Ton* & over @ 65¢/lb.	Less than ton @ 80¢/lb.	Ton* & over @ 75¢/lb.
Kit weight						
Part A	12 lbs. 8 oz.	12 lbs. 8 oz.	11 lbs. 3 oz.	11 lbs. 3 oz.	11 lbs. 0 oz.	11 lbs. 0 oz.
Part B	1 lb. 0 oz.	1 lb. 0 oz.	1 lb. 6 oz.	1 lb. 6 oz.	1 lb. 14 oz.	1 lb. 14 oz.
TOTAL	13 lbs. 8 oz.	13 lbs. 8 oz.	12 lbs. 9 oz.	12 lbs. 9 oz.	12 lbs. 14 oz.	12 lbs. 14 oz.
Kit Volume (Gallon)						
Part A	1.000	1.000	1.000	1.000	1.000	1.000
Part B	0.062	0.062	0.086	0.086	0.117	0.117
TOTAL	1.062	1.062	1.086	1.086	1.117	1.117
Kit Volume (Cubic Inches)	245	245	250	250	260	260
Mixed Cost/Gal. (321 Cubic In.)	$ 6.90	$ 6.10	$ 8.10	$ 7.45	$ 9.25	$ 8.55
Cost/Cubic In.	3¢	2.64¢	3.5¢	3.22¢	4¢	3.7¢
Purchase Price/Kit Minimum Order** 3 Kits	$ 7.40	$ 6.50	$ 8.75	$ 8.10	$ 10.35	$ 9.65

F.O.B. BELLEVILLE. TERMS: 1/10-N/30

* Annual Ton Contracts Available

** Single Introductory Kits Based on One-Gallon Part A Available for Limited Period

When you call . . . these

HARDMAN/DPR

men can service your needs

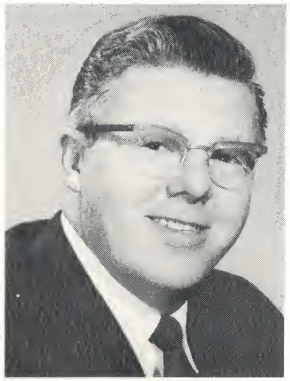
H. V. HARDMAN CO., INC. AND ITS SUBSIDIARY DPR INCORPORATED

600 CORTLANDT STREET, BELLEVILLE, NEW JERSEY 07109

(201) 759-3700

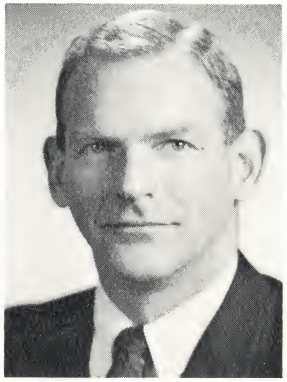
Kenneth Hardman
President

Alfred Anderson
Chief Engineer



Alexander Bertelson
General Sales Manager

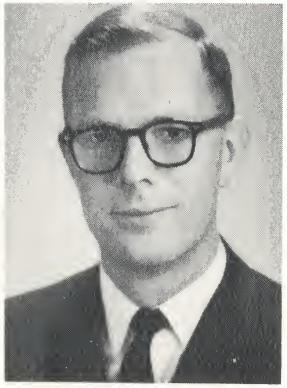
Roger Critchlow
Sales Manager
Triplematic Equipment Division



Malcolm Doane
Director
Research and Development

James Hardman
General Manager

John Hardman
Manager
Production and Purchasing



Henry Pande
Special Polymer Research and Manager
Hardman International Division

Robert Rapp
Development Engineer

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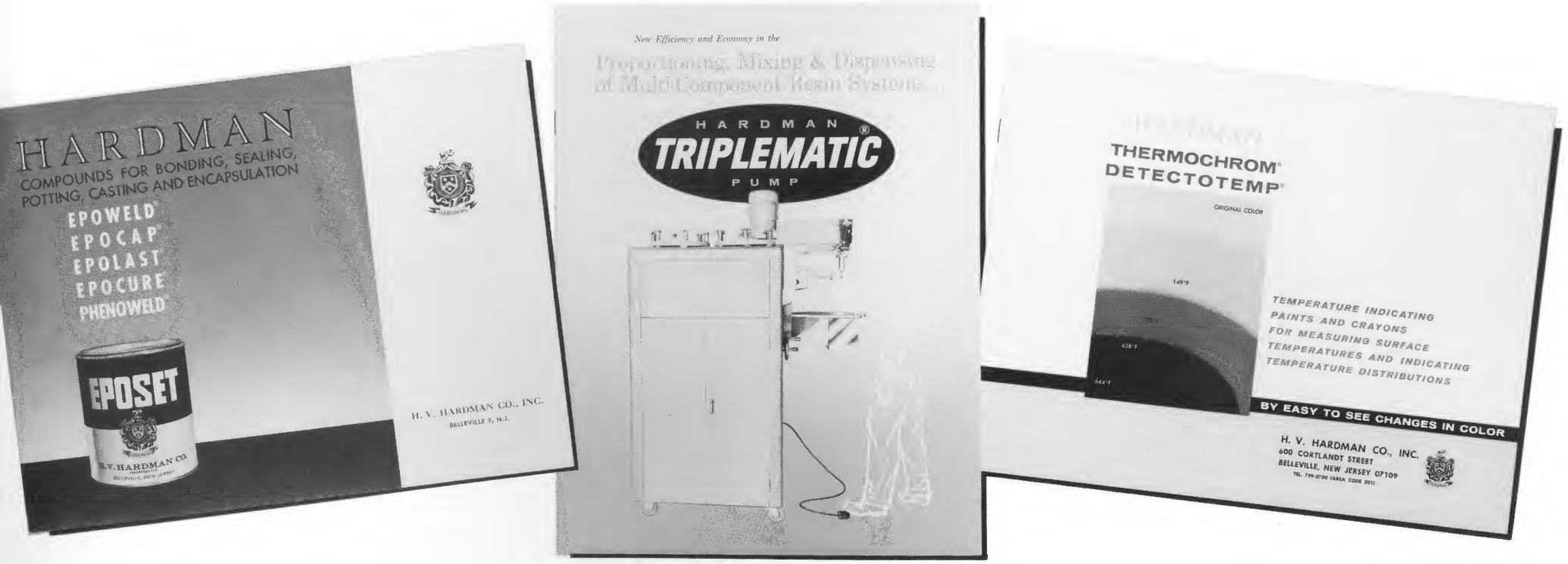

LITERATURE AVAILABLE UPON REQUEST

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